Appl. No.: 10/026,121
Amdt. Dated: 06/17/2005
Off. Act. Dated: 03/17/2005

REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested in view of the foregoing amendments claims and the discussion presented herein.

The undersigned calls to the attention of the Examiner that the undersigned has become attorney of record and that all further communications should be directed to the undersigned at the address and telephone number listed below. A Power of Attorney is being submitted herewith.

1. Rejection of Claims under 35 U.S.C. § 103.

Claims 19-25, 27, 28 and 30-39 were rejected under 35 U.S.C. § 103 as being obvious in view of the combined teachings of U.S. Patent No. 4,337,759 to Popovich et al. and newly cited U.S. Patent No. 6,473,554 to Pelka. Claim 19 is independent.

In response, the Applicant respectfully submits that the cited references have been misapplied and/or the limitations of the pending claims have not been properly interpreted.

To assist the Examiner with proper interpretation of the limitations in the Applicant's claims, the claims have been amended to more clearly recite the subject matter of the invention. The claims have been amended for clarity, grammatical prose, and for consistency of terminology. With regard to the teachings of the cited references, the Applicant will now discuss the reasons why the cited combination of Popovich et al. and Pelka does not fairly teach or suggest the claimed invention.

A close reading of Popovich et al. shows that the cited reference teaches a reflector apparatus which employs "Total Internal Reflection", known in the art as TIR. Characteristically, TIR devices rely on a transparent element wherein radiation (e.g. light) enters through one side of the reflector and into the body of the reflector where the radiation is redirected into a convergent pattern that is directed through the other side of the reflector and to a focal point. The fact that Popovich et al. employs TIR can clearly be seen by referring to, for example, the specification at col. 2, lines 12-17; FIG. 1; FIG. 3; FIG. 5; and elsewhere. As can be seen, Popovich et al. uses a

PAGE 9/15 * RCVD AT 6/17/2005 11:27:59 AM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/1 * DNIS:8729306 * CSID:9164981074 * DURATION (mm-ss):04-08

transparent reflector wherein the reflection is internal to the reflector, and does not use a reflector that has a mirrored surface wherein the radiation does not pass through the reflector but is reflected solely from the face of the reflector.

In other words, Popovich et al. clearly teaches a reflector that relies on TIR rather than specular radiation and requires the use of a transparent reflector element to provide for TIR. The very term itself "Total Internal Reflection" (emphasis added) means that all of the reflection is internal. The reflection cannot, therefore, be "specular" which is the complete opposite of internal reflection.

With regard to the term "specular" reflection as used in the Applicant's claims, the Examiner refers to col. 4, line 31 of Popovich et al., and relies on that portion of Popovich et al. as teaching specular radiation. Yet, what Popovich et al. states at the cited location is "and passing internally of the facet for reflection by face 14." That phrase does not teach specular radiation. Reading further to lines 32-34, Popovich et al. states that "For this purpose, the face may be silvered at 17. The reflected rays 16c then pass toward and through exit face 13, normal thereto, and directly toward the target zone."

Again, such a description is contrary to, and inconsistent with, specular reflection. Popovich et al. clearly describes a reflector wherein, for example, referring to FIG. 1 and 4d, the radiation enters an entry face 12, undergoes internal reflection by means of the stair-stepped faces 12 which have internal reflection faces 14 (with silvering 17), and exits the exit face 13 toward a target zone 15.

As can be seen, Popovich et al. shows refractive facets reflecting by an internal reflection face 14, which uses the Total Internal Reflection (TIR) as a sole mechanism of reflection (see, col. 4, lines 16-24). Again, note that the use of TIR alone or in conjunction with refraction is explicitly stated in Popovich et al. at col. 2, lines 12-15.

It will be appreciated by those skilled in the art that TIR is defined as a phenomenon of internal light reflection at the interface between a refractive media with a higher optical density and another refractive media with a lower optical density. TIR

PAGE 10/15 * RCVD AT 6/17/2005 11:27:59 AM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/1 * DNIS:8729306 * CSID:9164981074 * DURATION (mm-ss):04-08

only occurs at the refractive media boundary with the light remaining within the first refractive media. Furthermore, it can only occur when the second media is transmissive and the incidence angle is greater than the critical angle θ_c. The critical angle can be found from the relation:

$$\theta_c = \sin^{-1}\frac{n_2}{n_1}$$

where n_1 and n_2 are the refraction indices of the less optically dense media and the more optically dense media, respectively.

In contrast, the specular reflection of electromagnetic waves, being characterized by a sharply defined beam resulting from reflection off a smooth surface, such as a mirror, always maintains the integrity of the incident wavefront and can occur at any angle of incidence.

Popovich et al. does not teach, suggest or provide motivation or incentive for using mirrors for redirecting the incident radiation and achieving, for example, larger bend angles. Please note Popovich et al.'s acknowledgement of the limitation of his device regarding the reflection angle at col. 2, lines 47-50 where it is stated:

> "...Total Internal Reflection alone is limited to incident angles greater than Brewster's angle and therefore to redirective bend angles less than 180° - 2xBrewster's angle (about 96° for acrylic)..."

The Applicant respectfully submits that the present invention, which is directed to mirrored (non-transmissive) surfaces reflective externally (in direct contrast with internal reflection at TIR faces) by means of the specular reflection, is completely different than what is taught by Popovich et al. As a matter of optics, the specular reflection of the mirrors allow for any bend angles up to 180° (compare to 96° cited by Popovich et al.).

PAGE 11/15 * RCVD AT 6/17/2005 11:27:59 AM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/1 * DNIS:8729306 * CSID:9164981074 * DURATION (mm-ss):04-08

Clearly, TIR and specular reflection are mutually exclusive for a particular surface. Therefore, employing the specular reflection is precluded in Popovich et al.'s device even if his refractive facets are silvered at their internally reflective faces. Thus, by teaching TIR surfaces, Popovich et al. clearly teaches away from using the specularly reflecting surfaces such as the mirrored surfaces taught in the present invention. Furthermore, Pelka does not supply what is missing from Popovich et al., and there is no basis whatsoever for the Examiner concluding that one of ordinary skill in the art would find the Applicant's invention to be obvious in view of the cited references.

In complete contrast to the teachings of Popovich et al., the Applicant employs specular reflection. Specular reflection and TIR are complete opposites, cannot be used together (to do so would be a contradiction in terms), and are unrelated. Furthermore, the Applicant's configuration of reflective elements is unlike that of Popovich et al. First, note that individual reflective elements in the Applicant's invention create beam convergence. Second, the array of reflective elements creates direction convergence wherein the convergent beams from individual elements are directed by means of specular reflection to converging directions through spaces between adjacent reflective elements. These aspects of the invention were present in the claims prior to amendment herein, and the Applicant has amended the claims for clarification in the regard. Furthermore, note that the claim language prior to amendment referred to "single" specular reflection. The Applicant has changed the phrase "single specular" to "single stage specular" to be consistent with terminology used in the art. The term "single stage" would be understood by one of ordinary skill in the art as not limiting the term "specular". Accordingly, the term is used by the Applicant herein for purposes of clarification only.

Turning then to Pelka, the Examiner cited that reference as teaching "internal reflecting surfaces with curved profiles" as stated in the Office Action. Based on that teaching, the Examiner concluded that it would be obvious to use Pelka's concave

PAGE 12/15 * RCVD AT 6/17/2005 11:27:59 AM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/1 * DNIS:8729306 * CSID:9164981074 * DURATION (mm-ss):04-08

surfaces in Popovich et al.'s device.

There are several problems with the combination of Pelka and Popovich et al., the most significant of which the Applicant notes is the admission by the Examiner that Pelka teaches internal reflecting surfaces. Clearly, Pelka does not teach specular reflection, but teaches internal reflection. The specular reflection of the Applicant's invention is external, however. The combination of Popovich et al. and Pelka does not teach or fairly suggest the reflector elements recited in the Applicant's claims, and one of ordinary skill in the art would not be motivated or find incentive to modify a Popovich et al./Pelka reflector to employ an entirely different principle of operation - namely specular reflection.

But, the distinguishing characteristics do not stop there. Both Popovich et al. and Pelka employ reflective elements which are integral structures rather than discrete components. More particularly, both references employ Fresnel-type reflectors wherein the reflective elements are formed on a common substrate and are joined to each other. This can clearly be seen in the cited references. Accordingly, neither reference singly or in combination provides for any capability of adjusting the relative position of individual reflector elements based on the position of the incident radiation. Nor are discrete, unjoined reflective elements fairly suggested by the cited references. Therefore, the Applicant has further clarified the pending claims by reciting that the Applicant's reflective elements are discrete elements which are unjoined along their longitudinal ends.

Lastly, the Applicant has amended the claims to further recite that the reflective elements are non-transparent; hence, the Applicant's reflective elements are limited solely to specular reflection.

Based on the foregoing, the Applicant respectfully submits that each of the pending claims recites subject matter which is neither taught by, nor fairly suggested, by the cited combination.

In addition, the Applicant respectfully notes that a number of the dependent

PAGE 13/15 * RCVD AT 6/17/2005 11:27:59 AM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/1 * DNIS:8729306 * CSID:9164981074 * DURATION (mm-ss):04-08

claims which, when taken as a whole as is required for examination, recite subject matter which would not have been obvious to one of ordinary skill in the art. Yet, the Examiner did not address all of the limitations of the dependent claims. For example, Claim 30 recites the positional relationship of the incident and reflected radiation. A careful reading of Claim 30 as well as reference to Applicant's FIG. 3 and FIG. 4, shows that the reflected radiation is "off-axis" and is between reflective elements adjacent their rear longitudinal edges. The Applicant's "off-axis" reflection is in stark contrast to the typical on-axis reflection seen in Popovich et al. (e.g., see FIG. 1) where the reflected energy converges at a central focal point, or the unfocused reflection taught by Pelka. Claim 30 was not even discussed by the Examiner.

In fact, an examination of the dependent claims is generally missing from the Office Action.

Therefore, the Applicant respectfully submits that the Examiner has failed to make a prima facie showing of obviousness of Claim 19 and, therefore, Claim 19 and the claims that depend therefrom should be allowed. Furthermore, the Examiner has not examined the elements of the dependent claims in general and a showing of obviousness when those claims are considered as a whole.

2. Amendments Made Without Prejudice or Estoppel.

Notwithstanding the amendments made and accompanying traversing remarks provided above, the Applicant has made these amendments in order expedite allowance of the currently pending subject matter. However, the Applicant does not acquiesce in the original grounds for rejection with respect to the original form of these claims. These amendments have been made without any prejudice, waiver, or estoppel, and without forfeiture or dedication to the public, with respect to the original subject matter of the claims as originally filed or in their form immediately preceding these amendments. The Applicant reserves the right to pursue the original scope of these claims in the future, such as through continuation practice for example.

PAGE 14/15 * RCVD AT 6/17/2005 11:27:59 AM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/1 * DNIS:8729306 * CSID:9164981074 * DURATION (mm-ss):04-08

Appl. No.: 10/026,121
Amdt. Dated: 06/17/2005
Off. Act. Dated: 03/17/2005

3. Conclusion.

Based on the foregoing, the Applicant respectfully requests that the various grounds for rejection in the Office Action be reconsidered and withdrawn with respect to the presently amended form of the claims, and that a Notice of Allowance be issued for the present application to pass to issuance.

In the event any further matters remain at issue with respect to the present application, the Applicant respectfully requests that the Examiner please contact the undersigned below at the telephone number indicated in order to discuss such matter prior to the next action on the merits of this application.

Date: 6/17/05

Respectfully submitted,

John P. O'Banion, Reg. No. 33,201
O'BANION & RITCHEY LLP
400 Capitol Mall, Suite 1550
Sacramento, CA 95814
(916) 498-1010

PAGE 15/15 * RCVD AT 6/17/2005 11:27:59 AM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/1 * DNIS:8729306 * CSID:9164981074 * DURATION (mm-ss):04-08